Training in child care and carrying out auriculotherapy techniques for mothers of premature newborns: double-blind clinical trial

Zahra Ghasempour [1]
https://orcid.org/0000-0002-1983-4115

Moussa Abolhassani [2]
https://orcid.org/0000-0003-4384-7669

Anoosheh Gholami [3]
https://orcid.org/0000-0001-7378-8423

Farzaneh Karimi [4]
https://orcid.org/0000-0002-5703-6114

Mobina Dokhaei [5]
https://orcid.org/0000-0002-4474-8964

Niloofar Rabiee [6]
https://orcid.org/0000-0002-8577-6777

[1] Department of Nursing. Shirvan School of Nursing. North Khorasan University of Medical Sciences. Bojnurd, Iran.
[2] Cognitive and Behavioral Research Center. Aja University of Medical Sciences. Tehran, Iran & Inv Member. International Federation of Inventors' Associations-IFIA. Geneva, Switzerland. E-mail: moussa.abolhassani@gmail.com.
[3] Department of Midwifery. School of Medicine. Alborze University of Medical Sciences. Karaj, Iran.
[4] Department of Midwifery. Birjand branch, Islamic Azad University. Birjand, Iran.
[5] GIET College of Pharmacy. Andhra University. Rajahmundry, Andhra Pradesh, India.
[6] School of Nursing and Midwifery. Shahroud University of Medical Sciences. Shahroud, Iran.

Abstract

Objectives: this study aimed to investigate the effect of education and auriculotherapy on stress, anxiety, and depression, and coping responses in mothers with premature infants.

Methods: this is a randomized clinical trial study at Bahar Hospital carried out with 90 mothers with premature infants admitted to the neonatal intensive care unit. Those eligible for hospitalization were included in the study and distributed into three groups before intervention: (30 ones in the control, training, and auriculotherapy groups, respectively). The mean stress, anxiety, depression, and coping responses in mothers were measured both at the beginning of the study and before neonatal discharge.

Results: there was no statistically significant difference in terms of anxiety, stress, and depression scores between the three groups before the intervention. However, after the intervention, there was a significant statistical difference between these three groups, which was among the mean scores of anxiety, stress, and depression. In terms of coping responses, the mean emotional and problem-oriented score in all three groups before and after the intervention is statistically significant.

Conclusions: educating mothers and auriculotherapy pressure therapy are simple and practical methods in reducing anxiety, stress, depression, and increase coping responses; consequently, they can be used in neonatal intensive care.

Key words *Education, Auriculotherapy, Anxiety, Stress, Depression*

http://dx.doi.org/10.1590/1806-9304202400000391-en

Introduction

One of the best divine gifts is the birth of a healthy baby while having a premature baby creates a severe psychological crisis for parents. According to the World Health Organization, babies who are born earlier than 37 weeks are named premature infants.[1] Worldwide, about 15 million babies are born each year prematurely. Premature birth is the most important cause of increased complications and infant mortality.[2] Iran is one of the countries where the rate of preterm birth is high. In Iran, 5,000 babies are born daily, about 12% of who are premature and underweight, and about 9% of infants need neonatal intensive care unit after birth.[3] The neonatal intensive care unit is a stressful space for both mothers and fathers.[4] The longer the period and duration of neonatal care are in the neonatal intensive care unit, the higher the anxiety, stress and the impacts on the mental health of mothers.[5] It has been shown in a study that mothers with premature infant experience higher levels of stress and tension than mothers with full term.[6] Usually, mothers face coping strategies when faced with these stressful situations. In this regard, there are two general coping strategies that a person uses when facing problems, including problem-oriented coping strategy and emotion-oriented one. In dealing with the problem-oriented person, the mother focuses on the stressful issue. She tries to take constructive measures to change the situation or eliminate it. Still, in the emotion-oriented confrontation, she tries to control the emotional consequences of the stressful event to maintain her excitement balance.[7]

One of the factors making mothers whose babies have been hospitalized calm and reduce their anxiety and stress is the mother's involvement in caring for their baby. A research carried out in Iran, in 2018, has shown that supporting the family and giving information and education to parents makes them feel in control and empowered in their situations and participate more in caring for the baby.[1] Proper communication between the mother and the premature infant also has a positive effect on reducing and improving premature complications. In addition to educational support, complementary methods of anxiety relief have been considered in recent years.[8] In this regard, the technique of acupressure can be used as a non-invasive and non-pharmacological method. Auriculotherapy is a method of complementary medicine that means stimulating the curriculum or external ear, and in traditional Chinese medicine, it is a branch of acupuncture. This technique is done in different ways, including electrical stimulation, the use of needles or granular labels, and ear pressure. In this regard, acupressure technique can be used as a non-invasive and non-pharmacological method. Auriculotherapy is one of the methods of complementary medicine that improves the blood circulation of the whole body, deep relaxation stimulates the brain, improves the immune system, etc. among its benefits.[9]

Auriculotherapy can be useful in balancing the levels of hormones and neurotransmitters in the body and brain. Pressure in specific areas leads to recovery and return of energy to the body and improves the general condition of the body. Improving the circulation of the whole body, deep relaxation, stimulating the brain, improving the immune system as a preventive measure against diseases are other benefits of auriculotherapy.[10] The results of a study carried out in Taiwan, in 2016 showed that the auriculotherapy technique was effective in reducing maternal anxiety after the cesarean section.[11] Given the fact that mothers play an essential role in the upbringing of children, the research suggests that maternal mental health is very effective in the cognitive and emotional development of the infant. As a result, impaired maternal mental health can indirectly lead to developmental and behavioral problems in infants. This study aimed to investigate the effects of education and auriculotherapy on stress, anxiety, and depression, and coping responses in mothers with premature infants.

Methods

This double-blind three-group clinical trial study was conducted in the Bahar Hospital with a tertiary level neonatal intensive care unit (NICU) in the northeast of IRAN over eight months in 2019, from December 2018 to July 2019.

After legal procedures and obtaining a license from Shahroud University of Medical Sciences and obtaining a letter of introduction for the cooperation of Bahar Hospital and the necessary coordination with the neonatal intensive care unit of Bahar Hospital in Shahroud, the process of sampling started by using the results of the study of Valiani *et al*.[12] and using the comparison formula of two averages to assess the anxiety score with 80% test power and 95% confidence interval and considering the possible drop of samples in this study, 90 people were examined.

Participants were mothers of first-born who were selected through convenience sampling. They were randomly allocated into the three equal groups (i.e., 30 individuals in the control, training, and auriculotherapy groups, respectively). The sampling method of study was convenience sampling. The individuals then entered the study using predetermined random allotment sequences from the website and under the supervision of a statistician, in the form of 6 blocks.

Inclusion criteria include: mother's age between 18 to 45 with Preterm infant aged 28^{w} to $36^{w}/6^{d}$, Satisfaction of participating in the study, infant's Apgar scores above six at the fifth minute, did not have any major congenital anomalies, had not suffered Grade III or IV intraventricular hemorrhage or subsequent periventricular leukomalacia, had not undergone surgery, and did not receive paralytic, analgesic, or sedative medications within 48 hours. Lack of a confirmed mother's history of depression and psychiatric illnesses. Exclusion criteria include: medically unstable, required oxygen or respiratory support, or mother had a history of drug abuse during pregnancy.

The data collection instruments included a demographic and the Stress, Anxiety, and Depression questionnaire (DASS-21) and the Billings and Mouse's Coping Strategies scale (CRI). The demographic information questionnaire contained 30 items written by the researchers and developed after reviewing the latest international books and articles on the topic of study whose validity was also determined via content validity. So, after being prepared, it was submitted to 7 faculty members and professors at Shahroud University of Medical Sciences for validation.

The DASS-21 items are scored based on a 4-point Likert scale from 0 (not applied to me at all) to 3 (significantly used by me or most of the time). Higher scores indicate more frequent symptomatology. Seven items comprise each of the three scales, including depression, anxiety, and stress. Depression scale includes seven phrases (1-5-10-13-16-17-21). Anxiety scale consists of seven phrases (2-4-7-9-15-19-20), and the stress scale consists of seven phrases (3-6-8-11-12-14-18). Since this questionnaire is a shortened form of 42 questions, the scores of each of the subscales should be doubled. In a study conducted by Sahebi *et al*.[13] (Iran, 2005), the internal consistency of DASS-21 was calculated using Cronbach's alpha coefficient obtained at 0.77, 0.79, and 0.7 for depression, anxiety, and stress scales, respectively. The validity of this form has been confirmed according to a structural narrative analysis conducted by Sahebi *et al*.[13] in Iran, in 2005. The reliability of the DASS-21 questionnaire in this study was determined using a Cronbach's alpha coefficient of 0.81 for the whole questionnaire.

The CRI scale was designed in 1984 to find an easy and valid way to evaluate coping responses consisting of 32 questions. The reliability coefficient of this questionnaire was obtained by retesting 0.79 and Cronbach's alpha subscale of the problem-solving scale of 0.90, cognitive evaluation 0.68, emotion-based coping 0.65, social support 0.90, and body-based coping 0.90. This questionnaire is in the form of a 4-point Likert scale (never, sometimes, often, always), for each question, the answer is between zero and 3, respectively. This questionnaire has 4 subscales including problem solving (questions 1-7-32), cognitive assessment (questions 3-5-6-8-29), based on excitement (questions 10-12-13-14-17-18-19-21-28-30), social (questions 2-4-9-11-16-21) and physical (questions 15-22-23-24-25-26-27-31) support. The final score of this questionnaire is obtained as a problem- and emotion-oriented confrontation. The sum scores of the two subscales of problem-solving and cognitive assessment give the score of the problem-solving counterpart, and the sum scores of the three subscales of emotion-based, social support, and monitoring provide the score of the emotion-oriented countermeasure. So that the highest score in problem-solving is 24 and the lowest one is zero, and in emotion-oriented, the highest is 72, and the lowest is zero.[14]

The questionnaires for all three groups were completed firstly after hospitalization and before the start of the intervention and secondly 5 days after intervention.

In the mother's education group, after baby hospitalization and after stabilization of both baby and mother with the permission of physician, information about the cause of the baby's hospitalization, ways to deal with the infection, change the position of the premature baby, breastfeeding with the breast or gastric tube, maintain the baby temperature, bathe and change diapers, disinfect hands, etc. were taught to mothers. All the given knowledge was available in the form of a pamphlet. Auriculotherapy was performed on mothers after stabilizing the condition of both mother and baby, the points used on both the left and right ears were symmetrical and included the "Shenman, muscle relaxation, tension, and anxiety points". Using a pointer pen, the researcher first rotated the pressure on these points in the right ear for 60 seconds at each location (a total of 4 turns for 4 minutes). Then he did the same in the opposite ear. This intervention was performed 12 times (twice a day). The control group received only routine care for the neonatal intensive care unit.

Data in all three groups in two time periods, the first time before interventions and the second time after the end of the sessions, were compared and evaluated using the relevant questionnaire. After data collection, all data were done using Statistical Packages for Social Science (SPSS) version 24.0 (IBM, Armonk, NY, USA). Using Kolmogorov-Smirnov test for normality. Values are expressed as Mean±SD or percentage. The chi-square test was used to describe the abundance of data, and the t-pair test was used to compare the data. To analyze the hypothesis, the mean scores are different in groups; a two-way analysis of variance with repeated measurements was used. *P*-value of less than 0.05 was considered significant. This study was approved by the Ethics Committee of

Shahroud University of Medical Sciences Shahroud, Iran (code: IR.SHMU.REC.1397.122) in 2018 and was registered in the Iranian Randomized of Clinical Trials in 2018 (code: IRCT20180108038265N2).

Results

In this study, 90 pregnant mothers who met the inclusion criteria were assigned to three groups and were evaluated after the interventions (Figure 1).

In this study, 58(65%) mothers had a diploma or bachelor's degree, 52(58%) were city residents and 61(68%) were housewives. 21(24%) mothers mentioned a history of miscarriage and 16(18%) mothers mentioned a history of premature birth. Other demographic information of mothers can be seen separately in three groups in tables 1 and 2. According to the results of statistical tests, there are no significant statistical differences between the demographic characteristics of the three groups, and the studied groups are statistically homogeneous (Tables 1 and 2).

The ANOVA test showed a statistically significant difference between the mean score of anxiety (p=0.002), the mean score of depression (p<0.001), the mean score of stress (p<0.001), the mean score emotion-oriented (p<0.001), after the intervention in the three groups, which were based on the Tukey test between the control group and educated one (p=0.001) (Table3).

The T-pair analysis showed that the mean score of anxiety and stress in training and auriculotherapy groups before and after the intervention was significant (p<0.001) also the mean score of depression, emotion-oriented and problem-oriented in all three groups before and after the intervention was significant (p<0.001) (Table3).

Figure 1

Flowchart of a woman's selection process. Shahroud, Iran, 2018 to 2019.

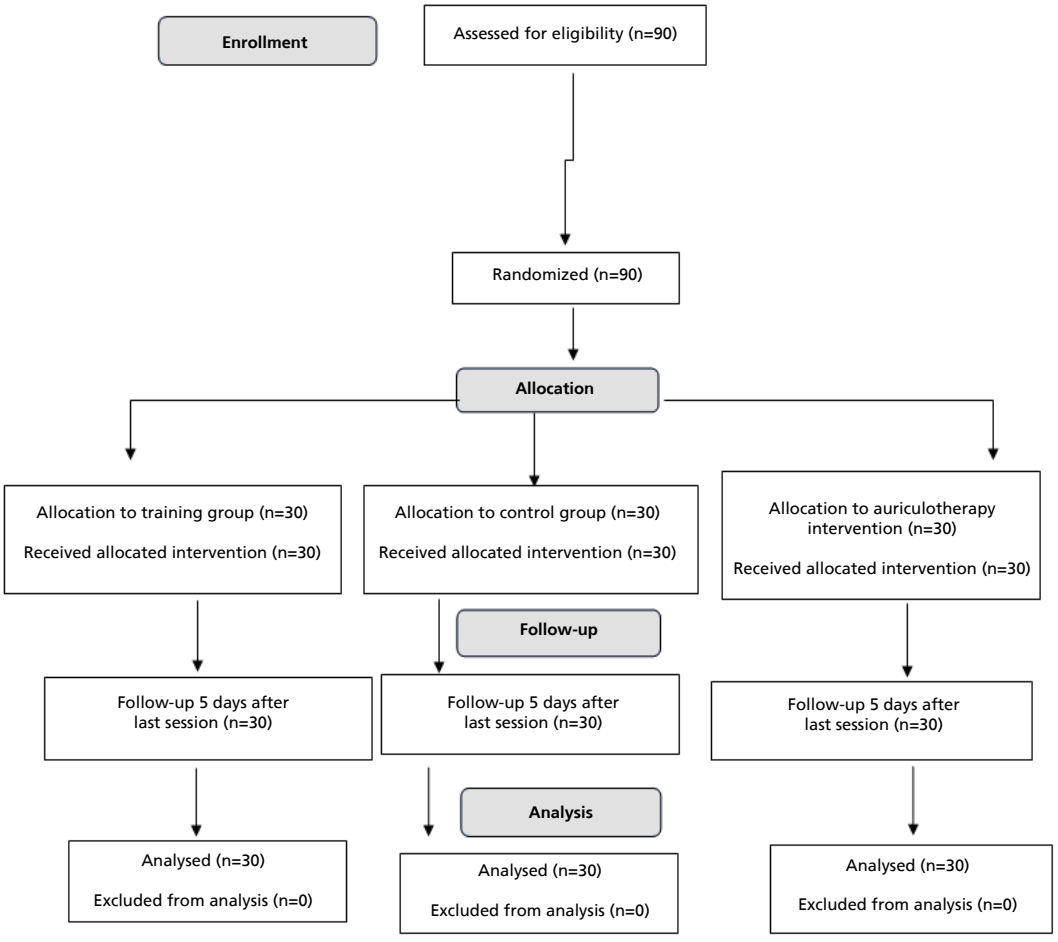

Table 1

Maternal frequency distribution according to demographic characteristics in the studied groups. Shahroud, Iran, 2018 to 2019.

Variables	Groups						*p**
	Control		Training		Auriculotherapy		
	n	%	n	%	n	%	
Education							0.853
High school	8	26.7	10	33.3	7	23.3	
Diploma	10	33.3	7	23.3	12	40.0	
bachelor's degree	10	33.3	11	36.7	8	26.7	
Higher than a bachelor's degree	2	6.7	2	6.7	3	10.0	
Habitation							0.279
City	18	60.0	20	66.7	14	46.7	
Rural	12	40.0	10	33.3	16	53.3	
Mothers' job							0.891
Housewife	20	66.7	20	66.7	21	70.0	
Employed	8	26.7	7	23.3	8	26.7	
Student	2	6.7	3	10.0	1	3.3	
Previous history of miscarriage							0.830
Yes	6	20.0	7	23.3	8	26.7	
No	24	80.0	23	76.6	22	73.3	
Previous history of preterm delivery							0.587
Yes	7	23.3	4	13.3	5	16.7	
No	23	76.7	26	86.7	25	83.3	
Premature rupture of the bladder							0.853
Yes	10	33.3	9	30.0	8	26.7	
No	20	66.7	21	70.0	22	73.3	
Chronic high blood pressure or pree-clampsia							0.333
Yes	4	13.3	3	10.0	7	23.3	
No	26	86.7	27	90.0	23	76.7	
Fetal distress							0.698
Yes	5	16.7	5	16.7	3	10.0	
No	25	83.3	25	83.3	27	90.0	
Placental abruption							0.227
Yes	2	6.7	3	10.0	0	-	
No	28	93.3	27	90.0	30	100.0	
Bleeding in the current pregnancy							0.919
Yes	4	13.3	5	16.7	5	16.7	
No	26	86.7	25	83.3	25	83.3	
Current gestational diabetes							0.927
Yes	5	16.7	5	16.7	6	20.0	
No	25	83.3	25	83.3	24	80.0	
Type of delivery							0.861
Vaginal	19	63.3	20	66.7	21	70.0	
Cesarean	11	36.7	10	33.3	9	30	
Number and stages of need for resuscita-tion (heating and stimulation to the final stage, including drug injection							0.500
No need to resuscitate	2	6.7	3	10.0	1	3.3	
Heating and mechanical stimulation	5	16.7	5	16.7	4	13.3	
Positive pressure ventilation	7	23.3	13	43.3	14	46.7	
Chip tube and mask	10	33.3	6	20.0	8	26.7	
Heart massage	5	16.7	1	3.3	3	10.0	
Epinephrine injection	1	3.3	2	6.7	0	-	

* Chi-square.

Table 2

Man and standard deviation of maternal demographic characteristics in the studied groups. Shahroud, Iran, 2018 to 2019.

Variables	Groups			*p**
	Control	Training	Auriculotherapy	
	$\bar{x}$ ± SD	$\bar{x}$ ± SD	$\bar{x}$ ± SD	
Age	25.70±6.66	25.53±6.81	26.70±6.65	0.768
Gestational age	31.50±2.17	32.20±2.38	30.97±2.06	0.102
Infant Weight at birth	1380±343.09	1552.33±444.729	1340.33±308.81	0.067
Infant weight before discharge	1772.67±216.89	1945±315.58	1858±209.16	0.034
The average length of hospital stays in the NICU	22.57±13.78	20.07±12.98	21.83±10.80	0.732
The average length of hospital stays in the neonatal ward	10.53±3.81	9.70±2.97	10.37±2.61	0.563

* ANOVA; NICU=Neonatal Intensive Care Unit.

Table 3

Evaluation and comparison of the mean of the measured variables before and after the intervention in the studied groups. Shahroud, Iran, 2018 to 2019.

Variables	Groups			*p**
	Control	Training	Auriculotherapy	
	$\bar{x}$ ± SD	$\bar{x}$ ± SD	$\bar{x}$ ± SD	
Anxiety, Depression and Stress				
Anxiety				
Before the intervention	15.03±4.74	15.30±4.96	16.83±5.44	0.335
After the intervention	15.00±4.34	10.80±4.07	12.87±4.61	0.002
*p***	0.949	<0.001	<0.001	-
Depression				
Before the intervention	15.53±4.61	15.67±5.25	16.77±6.23	0.626
After the intervention	17.83±5.57	11.60±3.62	12.13±5.47	<0.001
*p***	<0.001	<0.001	<0.001	-
Stress				
Before the intervention	19.03±5.63	16.87±4.22	17.87±5.96	0.293
After the intervention	19.67±6.23	12.70±3.46	13.03±3.99	<0.001
*p***	0.079	<0.001	<0.001	-
Coping responses				
Emotion-oriented				
Before the intervention	43.73±5.59	43.87±10.40	42.83±11.46	0.918
After the intervention	47.37±8.91	58.83±6.92	51.90±10.86	<0.001
*p***	<0.001	<0.001	<0.001	-
Problem-oriented				
Before the intervention	15.00±3.16	14.90±3.43	14.80±3.40	0.973
After the intervention	16.87±2.93	19.27±2.20	17.20±2.47	0.001
*p***	<0.001	<0.001	<0.001	-

* ANOVA; ** Paired-Samples *t*-Test.

Discussion

The result showed that the mean score of anxiety and stress in training and auriculotherapy groups before and after the intervention was significant. In addition, the mean score of depression, emotion-oriented and problem-oriented in all three groups before and after the intervention was significant.

The hospitalization of infants can be regarded as an unexpected or often stressful event for mothers. A research has shown that supporting the family and giving information and training to parents makes them feel controlling their situation and participating more in the care of the baby.[1] In this regard, a study carried out in Iran, 2014 showed that the need for awareness and information about premature infants and the need for acquiring skills in the care and maintenance of premature infants could help parents to have a better sense of control over the situation.[15] Browne and Talmi's[16] study carried out in USA, 2005 of family-centered interventions to increase parent-infant communication in the neonatal intensive care unit concluded that the intervention group had a higher level of awareness, dependence, and interaction than the control group. A study carried out in Iran, 2015 showed that maternal involvement in the care of premature infants admitted in the neonatal intensive care unit had affected their overt and covert anxiety. Similarly, a study found that teaching the care of premature infants to mothers relieved their stress significantly, which could be due to coherent

and practical training materials such as the present study. In the study of Bostanabadi *et al*.[17] carried out in Iran, 2015, parental participation had reduced maternal stress in the intervention group.

In another study carried out in Iran, 2014, neonatal care education was able to reduce the mean score of anxiety after the intervention by 42.82%.[18] In Nasiri *et al*.[19]'s study carried out in Iran, 2022, the supportive educational program reduced mothers' stress. Contrary to the results of the present study, a study carried out in the USA, 2009 showed that the presence and participation of parents in childcare did not affect their level of anxiety. Perhaps the reason for the discrepancy with the present study is the lack of written information provided to mothers.[20]

Ear acupressure can be a non-pharmacological method of treating pain in newborns. Various studies have examined the effects of auriculotherapy on anxiety levels, but a study similar to ours has not yet been performed. A study carried out in Taiwan, 2016 reported that auriculotherapy with ear acupuncture in Shenman spot reduces the anxiety of mothers by sticking labels containing vaccaria seeds on the fifth day after cesarean section.[11] Similarly, a study carried out in China, 2012 showed that auriculotherapy in postmenopausal women was able to reduce the use of alprazolam and zolpidem and to reduce anxiety.[21] In another study carried out in Brazil, 2017, auriculotherapy in nurses after ten sessions showed a statistically significant difference in anxiety levels.[22] In line with these studies, another study carried out in Brazil, 2020, demonstrated that auriculotherapy was able to significantly reduce state anxiety in pregnant women.[23] In a survey conducted by Valiani *et al*.[12] (Iran, 2018), in which auriculotherapy was performed on patients with Multiple Sclerosis-MS and a DASS-21 questionnaire was used to measure stress, anxiety, and depression. The results showed that the mean stress, anxiety, and depression scores in the auriculotherapy group decreased compared to the control group. In several other studies, the effect of auriculotherapy on anxiety and stress has also been mentioned.[24-26] In contrast, a study carried out in Iran, 2017, reported that this method (auriculotherapy) had no effect in reducing anxiety after cesarean.[27] The inconsistency of the present study may have its root in the absence of uniformity of applied acupressure place and duration.

There was also a statistically significant difference in the mean score of emotion-oriented and problem-oriented scores between all three groups of education, auriculotherapy, and control before and after the intervention to coping responses in mothers of premature infants. Whenever stress comes to mind, it confronts two problem-oriented and emotion-oriented strategies. Excitement-oriented coping involves efforts to regulate the emotional consequences of a stressful event and maintains emotional balance by controlling the emotions resulting from the stressful situation, and tries to maintain or change the source of stress.[28]

A study carried out in Nepal, 2021 showed that mothers' ability to cope with stress varies and that effective strategies in this regard include praying, attaching to the baby, to create a meaning in being with the baby, and making constant contact with him through kissing, touching, and caressing. Establishing eye contact, accepting the situation, and receiving support from other people are very effective strategies in increasing coping with stress.[29] Another study carried out in South Africa, 2019, found that most stress management practices in mothers with premature infants were positive.[30]

This study was conducted in one center and it is suggested that it would be conducted in a multi-center for future studies. It is also suggested to examine primiparous and multiparous mothers separately.

According to the study, one of the factors that can make the mothers of newborns calm in the intensive care unit, reduce the stress, anxiety, and depression of mothers and increase their coping responses is educating mothers and involving them in the care of their baby and performing acupuncture. Therefore, the use of these non-pharmacological methods that are simple, practical, and cost-effective is recommended because mothers are in direct interaction with the babies, and the quality of this relationship and communication can affect the growth process of the baby.

Author's contribution

Ghasempour Z, Gholami A and Rabiee N: conception and planning of the study, data collection, drafting or reviewing the manuscript.

Abolhassani M and Karimi F: conception and planning of the study, statistical analysis and interpretation of data, drafting or reviewing the manuscript.

Dokhaei M: statistical analysis and interpretation of data, drafting or reviewing the manuscript.

All authors approved the final version of the article and declare no conflict of interest.

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Received on November 21, 2022
Final version presented on December 19, 2023
Approved on December 21, 2023

Associated Editor: Lygia Vanderlei